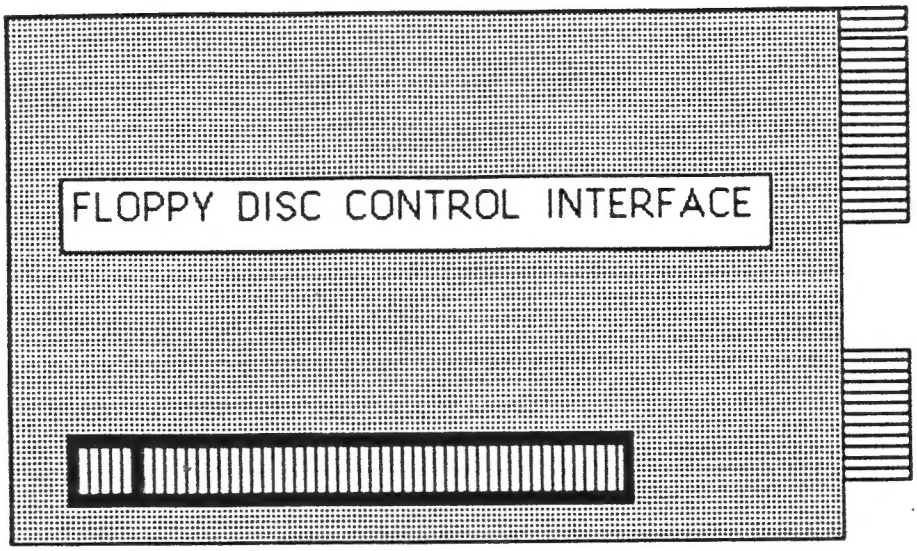

MODEL FD-68

INSTRUCTIONS

AERCO
ACME ELECTRIC ROBOT CO.
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(512) 451-5874

INTRODUCTION

Welcome to the AERCO FD-68 Floppy Disc Interface. This interface is designed to control up to 4 Shugart compatible disc drives. Size can be 3 inch to 8 inch, single or double sided (SS/DS). 8-inch drives are limited to single density (SD). All others can be single, double, or quad density (SD/DD/QD). In addition to the interface, the minimum disc system requires at least one drive and a power supply with +5v/2A and +12v/2A.

Some of the features included with the interface are:

64K of additional RAM for a total of 112K. The additional RAM is located in the Dock bank and can be accessed in 8K chunks. The Z-8ØA processor is, of course, only capable of addressing 64K at one time.

8K ROM to hold operating systems.

RGB output. The cable is additional and must be specified.

Fully compatible with disc drives and power supply from TS 1000.

No need to modify the computer.

Disc drives are availbale from AERCO or you can use your own. The drives must be modified to jumper +5v and +12v from the 4-pin power connector to pins 2 and 34 of the edge connector respectively. Care should be taken to cut any traces connected to pins 2 and 34 of the edge connector on the drives. Be sure to note the orientation of the beveled corners on the 4-pin power connector if you build your own cable. The drive select switch must be set on each drive. We ship all single drives as Drive A (DS-Ø) unless otherwise specified. With multiple drives, the Terminating Resistor must be removed from all drives except the one connected to the end of the 34-conductor Signal Cable.

CAUTION: CUT ANY TRACES CONNECTED TO PINS 2 OR 34 OF THE DISC DRIVE EDGE CONNECTOR IF YOU MODIFY THE DRIVE. VERIFY PROPER CONSTRUCTION OF THE POWER CABLE IF YOU BUILD IT.

The external power supply is used to power the disc drives only. It requires a 3-conductor (+5v/+12v/gnd) power cable to one of the drives. Additional drives are powered thru pins 2 and 34 of the signal cable.

INSTALLATION SET-UP:

NOTE:
Refer to System Installation Drawing

1. Remove power from the computer and the disc power supply.
2. Install the FD-68 Interface to the rear of the computer.
3. Connect the single connector of the 34-conductor signal cable to the 34-pin edge connector of the interface.

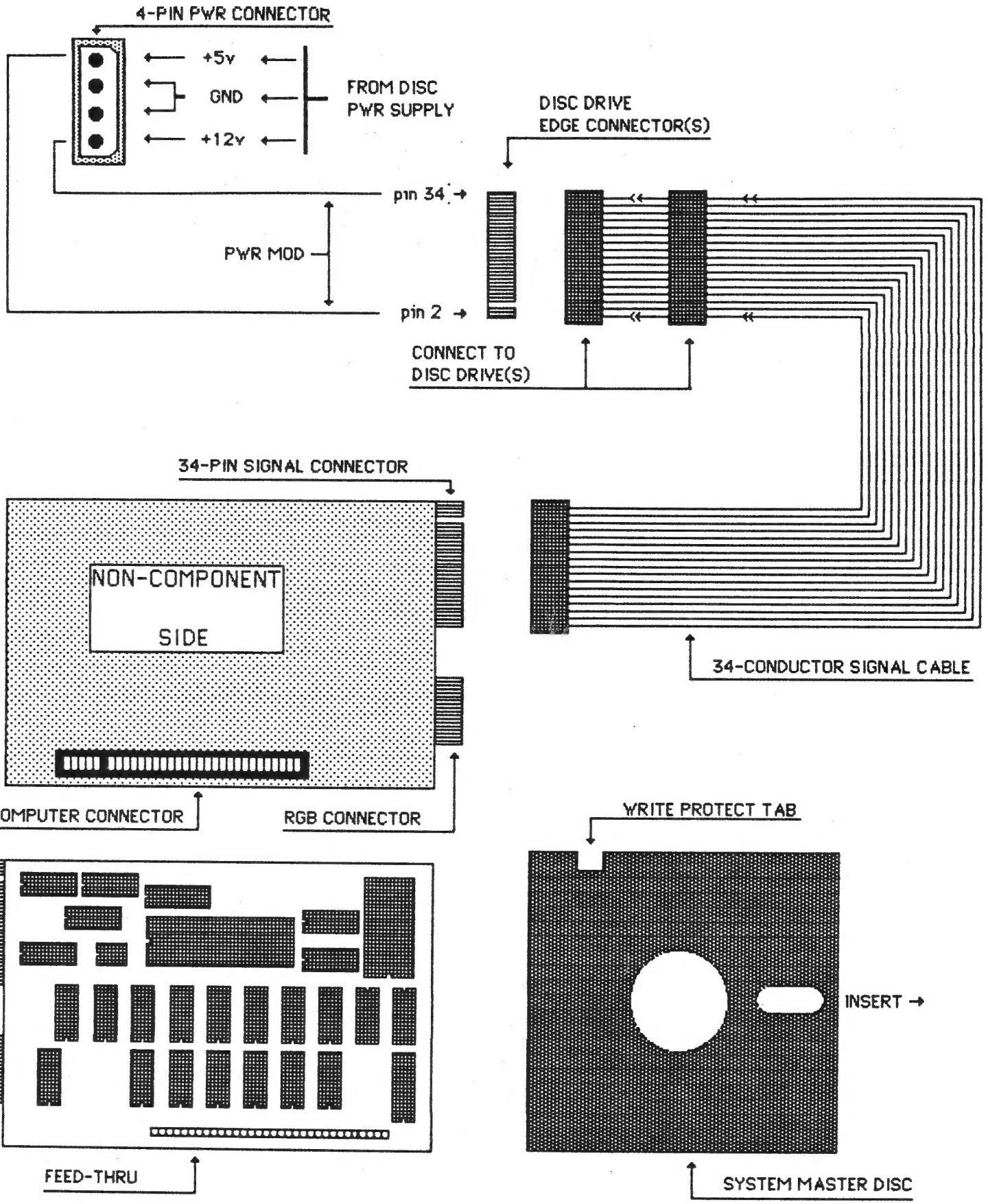
If your drives are not already mounted and connected:

4. Install the connector on the other end of the signal cable to the edge connector of the disc drive.
5. Connect the remaining signal connector to a second drive.
6. Connect the 3-conductor power cable to the disc drive(s)
7. Verify that Drive Select settings and Terminating Resistor placement are correct on all drives.

CAUTION: CHECK ALL CONNECTIONS BEFORE APPLYING POWER.

LIMITATIONS as of 4/18/85 DEVELOPMENTAL VERSION

NOTE: The .CHR, .DAT, and .LRO Extensions are not yet implemented. They will be provided on an update soon.



SYSTEM INSTALLATION DRAWING

THE DISC COMMANDS

The **MOVE** command is used to write information from the computer to the disc. The information may be of any of the types supported by the cassette tape system as well as several others. The type of information is described by a **period and three letters** after the name you give the information. This addition to the name is commonly called an **EXTENSION.** These are the Extensions currently supported.

.ARO AROS runs in the dock bank starting at 8000 Hex.
.BAS BASIC program and its variables.
.BIN BINARY data.
.BUT BOOT program to be executed from cold start.
.CHR CHARACTER array.
.DAT NUMERIC array.
.LRO LROS runs in the dock bank starting at 0.
.SCR SCREEN is a copy of the video display.

The extension is always 3 letters, but the main part of the name may be any length from 1 to 10 characters. For example, to save the video display as PIX, you would enter the following command: **MOVE"PIX.SCR",** The screen data will be saved onto the disc that was last used. If instead of using the currently selected drive you wish to specify drive C, enter **MOVE"C:PIX.SCR",**

The .ARO extension: SAVES/LOADS memory in the **Dock Bank,** starting at address **8000H.** The Chunks are selected and the program is started per the standard TIMEX rules for operating an **AROS (Application ROM Orientated Software).** Instead of running it from ROM, you are running it from **RAM** as loaded from the disc.

The .BAS extension: SAVES/LOADS **BASIC** program and data areas. An **optional Decimal** parameter may be specified as the starting Line Number. For example, to SAVE a program that is to commence running from Line 100 when loaded, enter **MOVE"NAME.BAS",100** To LOAD the program, enter **CAT"NAME.BAS",** A BASIC program may be started at a different location when it is loaded by specifying a new **Start Line** numeral, as CAT " Name. BAS", **start line.**

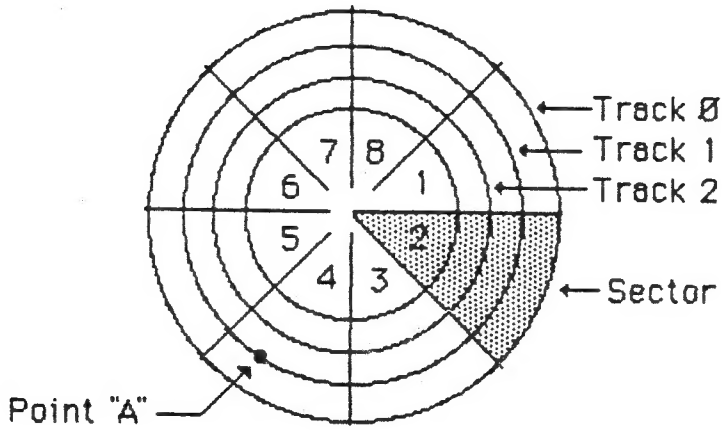
The .BIN Extension: SAVES/LOADS **binary data.** It is the equivalent of CODE in the tape system. **Two Decimal Parameters** are required when saving: the **Start address** and the **number of bytes.** No parameters are required to LOAD the CODE back into the system. For example: to SAVE 850 bytes starting at 26440, enter **MOVE "NAME.BIN", 26440, 850.** To LOAD

it back, enter **CAT "NAME.BIN",** A Binary program may be loaded into a different location by specifying the new location, as CAT" Name.BIN",**newnumber** .

The .BUT extension: An assembly language program written at **3400H (0D40H in the SPECTRUM mode)** and saved with the command **MOVE"0.BUT",** will be executed when the system is first turned on. Be sure that any programs that your boot program calls are on the disc. **CAT"0.BUT",** will load **Track 0, Sector 1** of the currently selected disc into the Boot memory area. **128 Bytes** are available for the Boot program.

DISC OPERATION THEORY

A disc can most easily be compared to a phonograph record. Data files are recorded in binary form and stored in the concentric grooves (tracks) of the disc. They are accessed by means of a read/write head which is partially analogous to the tone-arm of a record player. However, it is not necessary to move around each track in sequence to reach a particular point; the desired location can be arrived at directly (directly or random-access) by means of the track/sector method of addressing.
For addressing purposes, discs are formatted into tracks and sectors. Tracks are numbered sequentially, starting with the outermost track and working inward. Sectors are wedge-shaped and are numbered around the disc. (Note: sectors are electronic divisions only, not physical; they are not visually discernable.)



Example: a program starting a Point "A" would be located at track 1, sector 4.

The illustration used is a simplification. A typical floppy disc has 35/40/80 tracks per side with 10 sectors each.

On most floppy discs, tracks and sectors are located by utilizing a series of magnetic markers or headers which are spaced around the tracks at the beginning of each sector. The disc is kept constantly spinning at high speed (360 RPM); as the read/write head passes over each header, magnetically-encoded information including track and sector number, which side of the disc, and size of the track sector (256 SD/512 DD) is relayed to the disc drive circuitry. Thus, to access a particular address, the drive moves the head in or out to the correct track and then locates the desired sector, all by reading the disc headers.
An additional means of sector orientation is the index hole in the disc, located near the center, marking the beginning of sector 1. As the disc spins, the hole periodically aligns with another hole in the disc envelope, allowing a ray of light to pass through to a sensor in the drive circuitry. Although this does allow calibration from sector 1, its main purpose is to provide a check on the operation of the disc itself. The disc circuitry will be alerted to any irregularity of the disc spin (slowing, stopping, etc.) by changes in the timing of the sensor ray.

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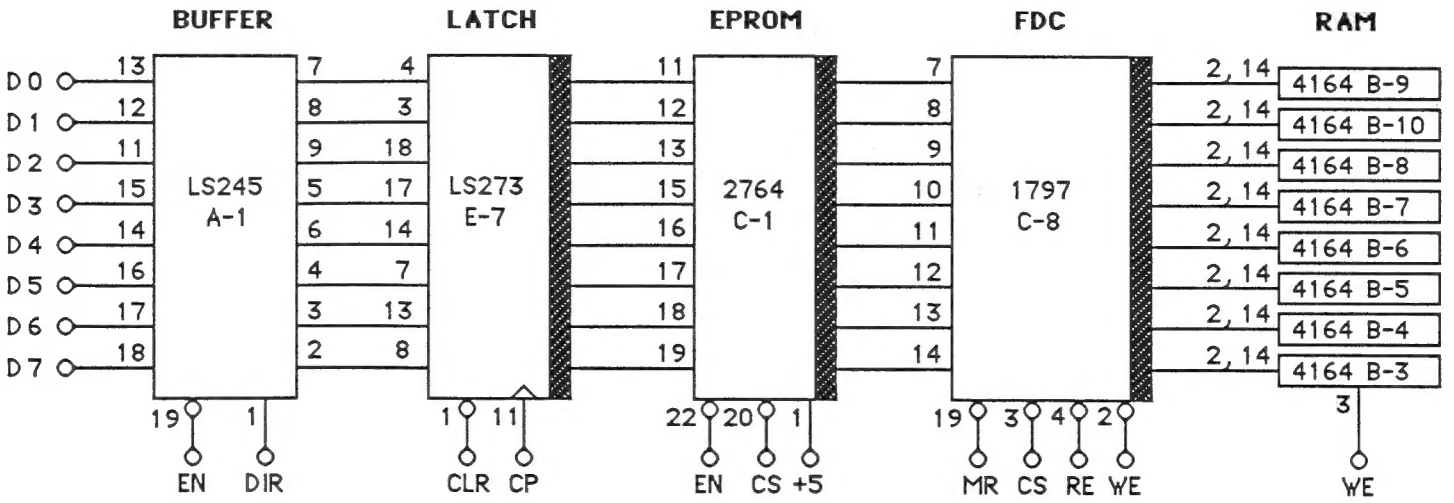
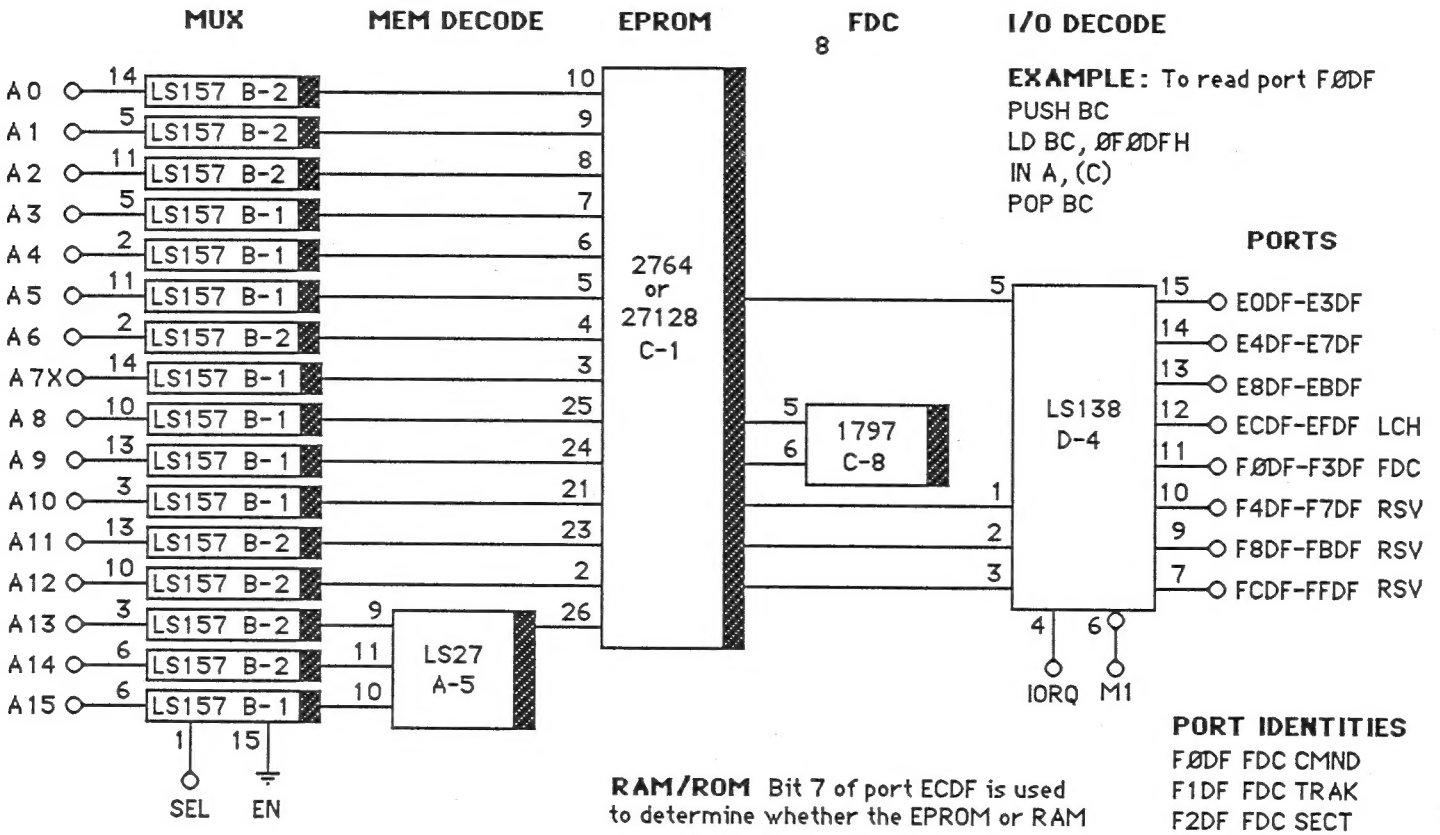
DATA BUS



ADDRESS BUS



EXAMPLE: To read port FØDF

```
PUSH BC
LD BC, ØFØDFH
IN A, (C)
POP BC
```

RAM/ROM Bit 7 of port ECDF is used to determine whether the EPROM or RAM is enabled in the bottom 8K of memory. Bit 7 is set LOW on Reset, EPROM selected.

DO NOT read ports ECDF-EFDF. This will set all bits of the latch high.

PORT IDENTITIES

FØDF FDC CMND
F1DF FDC TRAK
F2DF FDC SECT
F3DF FDC DATA
ECDF LATCH
E8DF USED BY RS 232
E4DF USED BY RS 232
EØDF USED BY CENT.

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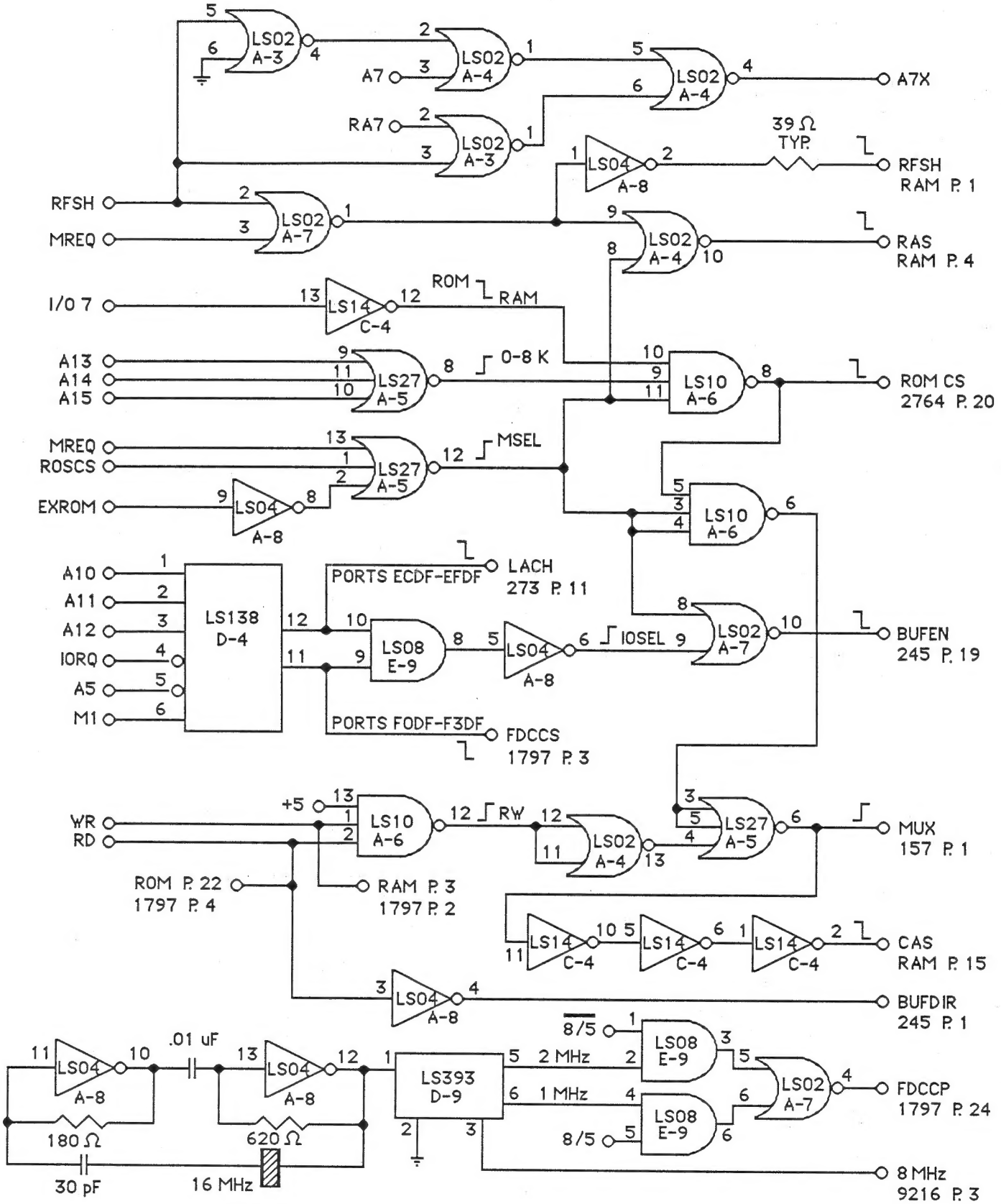
CONTROL LOGIC



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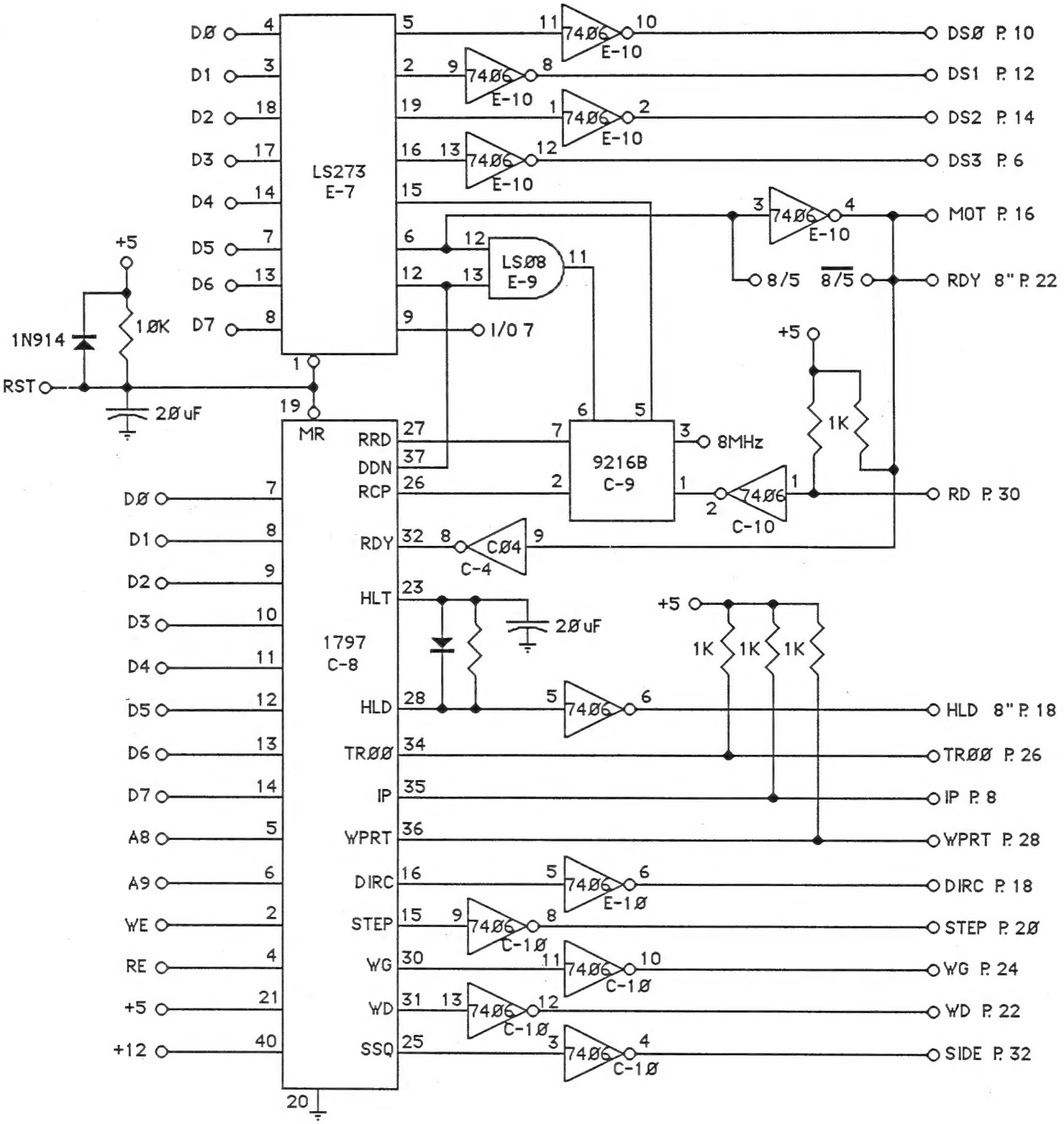
DISC CONTROLLER



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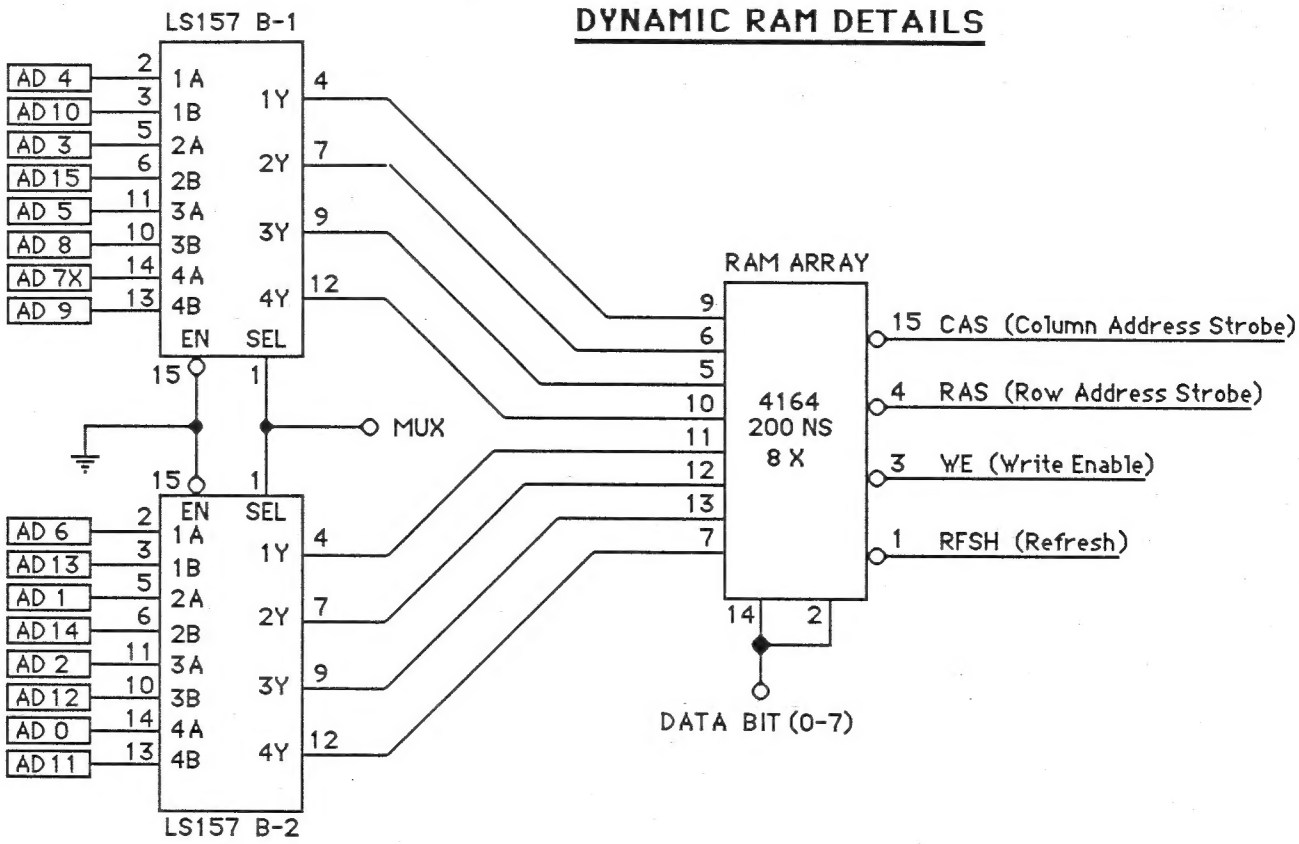
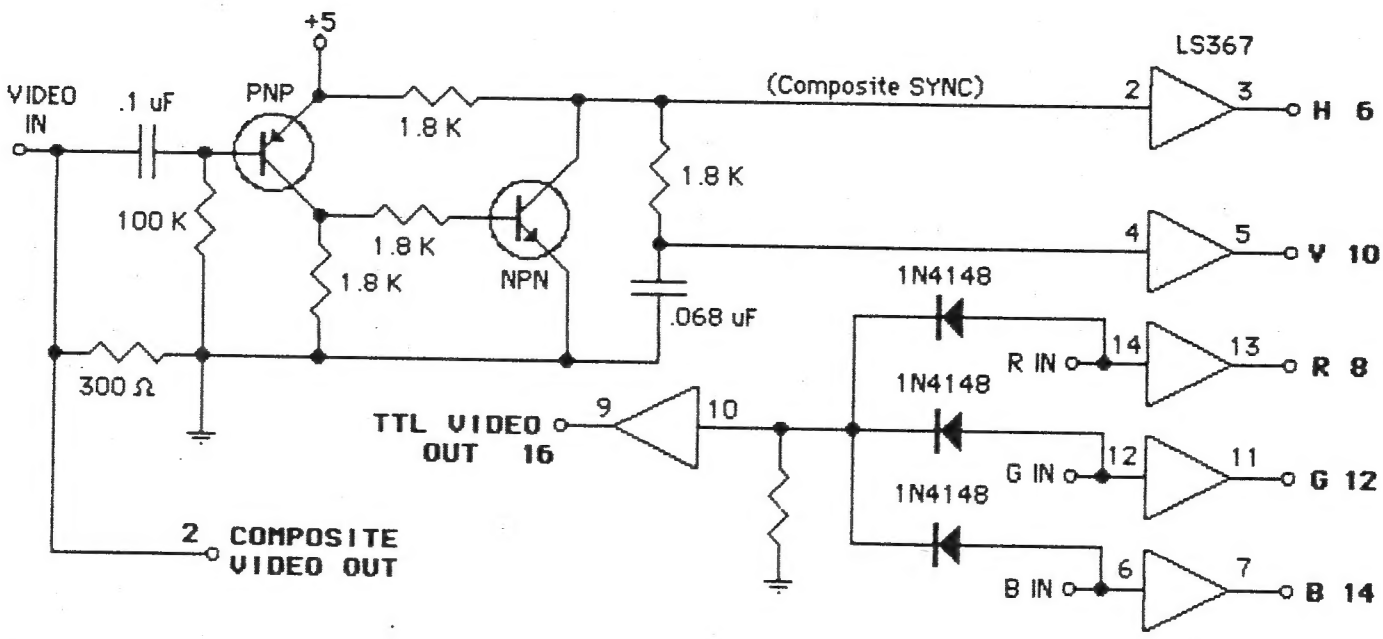
DYNAMIC RAM DETAILS

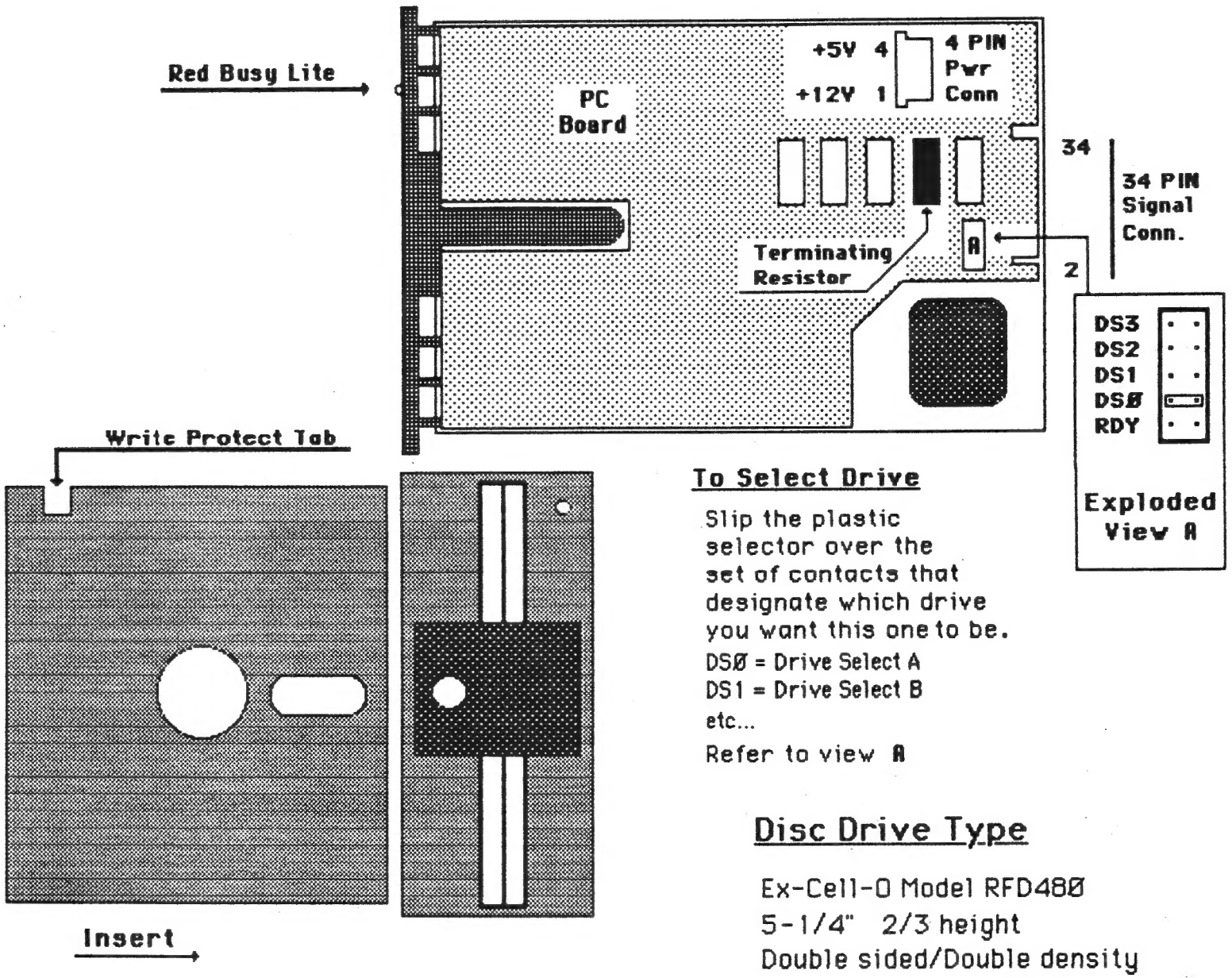


RGB VIDEO DETAILS



DISC DRIVE NOTES

1. Remove cardboard insert before operation.
2. Set drive select switch. All drives are shipped as DSØ (A) unless specified otherwise.
3. Insert diskette as shown with write protect tab toward the busy lite.
4. Always make back-ups of critical diskettes.
5. If you add a second drive, remove the terminating resistor from the drive **not** connected to the end of the ribbon cable.
6. Jumper +5v to pin 2 and +12v to pin 34 of signal conn.



To Select Drive

Slip the plastic selector over the set of contacts that designate which drive you want this one to be.

DSØ = Drive Select A
DS1 = Drive Select B
etc...

Refer to view **A**

Disc Drive Type

Ex-Cell-O Model RFD48Ø
5-1/4" 2/3 height
Double sided/Double density
4Ø T/side (48 TPI)
6 msec. track access time
4ØØ K-bytes storage